UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

NMFS Tracking No.:
2004/00527

September 20, 2004

William A. Wood, Forest Supervisor
Salmon-Challis National Forest
50 Highway 93 South
Salmon, Idaho 83467

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Boundary Creek Road Reconstruction Project on Bear Valley Creek, Fir Creek, Wyoming Creek, Cold Creek and Ayers Creek (HUC 1706020508), in Valley County, Idaho, and Cape Horn Creek (HUC 1706020506), in Custer County, Idaho (One Action)

Dear Mr. Wood:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed Boundary Creek Road Reconstruction Project on Bear Valley Creek, Fir Creek, Wyoming Creek, Cold Creek and Ayers Creek (HUC 1706020508), in Valley County, Idaho, and Cape Horn Creek (HUC 1706020506), in Custer County, Idaho. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Snake River spring/summer chinook salmon and Snake River Basin steelhead, and is not likely to destroy or adversely modify designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize incidental take associated with this action.

This document contains a consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR Part 600). NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for salmon. As required by section 305(b)(4)(A) of the MSA, conservation recommendations and provisions are included in the biological assessment and the Opinion, that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH.

If you have any questions regarding this letter, please contact Dan Blake of my staff in the Salmon Branch Office at (208) 756-6019.

Sincerely,

Russell M Strach for

D. Robert Lohn
Regional Administrator

cc: R. Rose - USFS
R. Snyder - USFS
R. Smith - USFS
D. Mignogno - USFWS
L. Brown - BLM
T. Curet - IDFG
I. Jones - Nez Perce Tribe
S. Althouse - Nez Perce Tribe
N. Murillo - Shoshone-Bannock Tribes
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L. Denny - Shoshone-Bannock Tribes

Endangered Species Act Section 7 Consultation Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Boundary Creek Road Reconstruction Project
Snake River Spring/Summer Chinook Salmon, Snake River Basin Steelhead
Bear Valley Creek, Fir Creek, Wyoming Creek, Cold Creek, Ayers Creek, Cape Horn Creek
1706020508 and 1706020506
Valley County and Custer County, Idaho

Lead Action Agency: U.S. Forest Service
Salmon-Challis National Forest

Consultation Conducted By: NOAA's National Marine Fisheries Service,
Northwest Region

Date Issued: September 20, 2004

Issued by: Russell M Strach for
D. Robert Lohn
Regional Administrator

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BMPs	Best Management Practices
BNF	Boise National Forest
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CRB	Columbia River Basin
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESUs	Evolutionarily Significant Units
FCRPS	Federal Columbia River Power System
Forest Road #578	Boundary Creek Road
Forest Road #579	Stanley-Landmark Road
HUCs	Hydrologic Unit Codes
IDFG	Idaho Department of Fish and Game
mg/l	milligrams per liter
MP	Mile Post
MPI	matrix of pathways and indicators
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NOAA Fisheries	NOAA's National Marine Fisheries Service
Opinion	Biological Opinion
PAHs	poly-cyclic aromatic hydrocarbons
PFC	Properly Functioning Condition
PFMC	Pacific Fishery Management Council
ppm	parts per million
RHCA	Riparian Habitat Conservation Area
RPMs	Reasonable and Prudent Measures
SCNF	Salmon-Challis National Forest
Services	NOAA's National Marine Fisheries Service and U.S. Fish and Wildlife Service
USFWS	U.S. Fish and Wildlife Service

1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (USFWS) (together "Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the Essential Fish Habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The Salmon-Challis National Forest (SCNF) proposes to improve 12.8 miles of road within the Boise National Forest (BNF) and the SCNF. The purpose of the Boundary Creek and Stanley-Landmark Road Reconstruction Project (Boundary Creek Road Project) is to restore road surface integrity and reduce sediment delivery to streams through reconstruction, culvert replacement, vegetation clearing, and surfacing actions. The SCNF is proposing the action according to its authority under the National Forest Management Act of 1976. The administrative record for this consultation is on file at the NOAA Fisheries Idaho State Habitat Office in Boise, Idaho.

1.1 Background and Consultation History

The Boundary Creek Road Project was first discussed at the February 25, 2004, Salmon-Challis Level 1 Team meeting. Discussion occurred at the March 18, 2004, Level 1 meeting about expansion of the project to 13 miles. A draft biological assessment (BA) was provided for discussion at the April 21, 2004, Level 1 meeting. Larry Zuckerman, NOAA Fisheries' Level 1 representative, informed the group that formal consultation would likely be needed for the project. NOAA Fisheries received a complete BA and EFH assessment on the Boundary Creek Road Project on May 3, 2004. A site visit that involved personnel from NOAA Fisheries and the SCNF occurred on June 7, 2004, at which time some project modifications were agreed to. The SCNF presented a revised BA to NOAA Fisheries that generally incorporated these changes on July 20, 2004. The Salmon-Challis Level 1 Team discussed the project additionally on

July 28, 2004. On August 17, 2004, SCNF presented NOAA Fisheries with new fish survey information and photographs documenting ESA-listed fish presence in the action area. Through discussions between NOAA Fisheries and the SCNF, agreement was reached on August 11, 2004, that NOAA would provide this Opinion for the project. Coordination and information sharing with the USFWS also occurred during the course of consultation.

The Boundary Creek Road Project would likely affect tribal trust resources. Because the action is likely to affect tribal trust resources, NOAA Fisheries contacted the Nez Perce Tribe and Shoshone-Bannock Tribes on June 1, 2004, pursuant to the Secretarial Order (June 5, 1997) and requested that any comments be provided by June 18, 2004. Scott Althouse, fishery biologist with the Nez Perce Tribe responded on June 2, 2004, offering support for the project's objectives to reduce sediment. He also expressed interest in being kept informed of developing a pit plan at the aggregate borrow source. Kermit Bacon, a technician for Salmon River habitat enhancement with the Shoshone-Bannock Tribes, responded on June 14, 2004, stating that Fir Creek has the potential to attract juvenile chinook salmon based on thermal regimes. He requested that this possibility be considered in any monitoring plan.

1.2 Proposed Action

Proposed actions are defined in the Services' consultation regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." Additionally, U.S. Code (16 U.S.C. 1855(b)(2)) further defines a Federal action as "any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken by a Federal agency." Because the SCNF proposes to enable the use of public resources that may affect listed resources, it must consult under ESA section 7(a)(2) and MSA section 305(b)(2). The BNF plans to conduct the Bear Valley Road Improvement project, which involves road reconstruction and culvert replacement activities beginning two to three miles upstream of the Boundary Creek Road Project. Formal consultation has been completed on that project (NOAA Fisheries 2003), but the Bear Valley Road Improvement and Boundary Creek Reconstruction projects are interrelated in that they improve a continuous road. Under 50 CFR Part 402, interrelated and interdependent activities are part of the proposed action. Therefore, the combined effects of the two projects are considered in this Opinion. The focus of this analysis is on the Boundary Creek Road Project but the effects of the Bear Valley Roads Improvement Project will also be reviewed.

The SCNF proposes to improve portions of the Stanley-Landmark Road (Forest Road #579) and the Boundary Creek Road (Forest Road #568) within the BNF and SCNF through road reconstruction, culvert replacement, vegetation clearing, and surfacing actions. No work will be done at or near the bridge crossings on Bear Valley Creek and Wyoming Creek. The work is scheduled to occur during 2004 and 2005 beginning July 15 and ending once the ground freezes (usually in late September). For the purposes of description, mile post (MP) numbers are used to

identify project locations, with MP 0.0 located at the junction of Forest Road #579 and MP 12.8 located at the portion of the work area on Forest Road #568 that is closest to the Boundary Creek launch site. Specific elements of the project are described below.

1.2.1 Dust Abatement

Dust palliatives will be applied beginning in 2005 to reduce dust, increase visibility, and preserve road integrity. Magnesium chloride will be applied along the entire 12.8 mile length of the reconstructed road. Application of magnesium chloride-lignin sulfonate is currently authorized for the 3 mile reach of Forest Road #579 between Highway 21 and Cape Horn Summit under the Salmon-Challis National Forest Road Maintenance Programmatic Agreement. The lignin sulfonate portion of the palliative will no longer be needed once the road is resurfaced with an aggregate/bentonite mix.

Based on information gained from a site visit by NOAA Fisheries and SCNF personnel on June 7, 2004, agreement was reached to exclude several sections of road from magnesium chloride dust abatement treatments due to the proximity of nearby water bodies. A revised BA specified that spraying would occur along those sections but an earthen berm would be installed to reduce the amount of magnesium chloride entering water bodies. The identified sections include the following: a marshy area along MP 5.6; 50 feet either side of the unnamed Fir Creek tributary crossing at MP 6.5; 50 feet either side of the Fir Creek crossing at MP 7.0; 50 feet either side of the Cold Creek crossing at MP 9.2; 50 feet either side of the unnamed Bear Valley Creek tributary crossing at MP 9.4; 50 feet either side of the Wyoming Creek crossing at MP 9.6; and 50 feet either side of the Ayers Creek crossing at MP 12.5. Treatments will not be needed at the Bear Valley Creek crossing, which is paved from MP 10.0 to MP 10.4. The SCNF will not apply magnesium chloride within 25 feet of streams.

Water for the dust palliative application will be drafted from the road bridge near the intersection of Forest Road #579 and State Highway 21, Bear Valley Creek at the Forest Road #568 bridge, and Fir Creek at the Forest Road #529 culvert. To prevent injury to small fish during drafting, mesh intake screens will be a maximum of 3/32-inch or double rolled 1/8-inch hardware cloth crimped at both ends. In 2005, 0.5 gallons of magnesium chloride will be applied to every square yard of road. In subsequent years, 0.35 gallons of magnesium chloride will be applied to every square yard of road. The total annual quantity of magnesium chloride will be split among three passes to minimize the potential surface runoff into the stream channel. Magnesium chloride will be applied with precaution to prevent direct and indirect application to nearby water bodies.

Representative streams will be monitored by field personnel to determine background chloride levels for reference and treated road segments. If monitoring detects magnesium chloride concentrations greater than 400 parts per million (ppm) in the stream channel, magnesium

chloride application will cease immediately and consultation will be reinitiated. Water quality monitoring sites are proposed for Cape Horn Creek and Fir Creek. Selected sites will be monitored immediately prior to and after magnesium chloride application.

1.2.2 Storage and Handling of Fuel and Toxic Materials

Fuel storage and other toxic materials used in the project will be stored at designated sites outside the Riparian Habitat Conservation Area (RHCA) and as far away from streams as possible. Fueling will occur outside the RHCA as well. Facilities will be provided to contain the largest possible spill. An emergency spill prevention and containment plan and kit will be provided on vehicles. Prior to the arrival of equipment at the project site it will be free of oil, fuel, or toxic leaks that could wash contaminants into the water.

1.2.3 Roadbed Raising and Surfacing

The roadbed will be raised and resurfaced in several stretches of the 12.8 mile road. To raise the roadbed, aggregate material from the fill material borrow source will be used. Surfacing will be done with a crushed aggregate mixed with bentonite binder. The road from MP 0.0 to MP 0.5, along Cape Horn Creek, will be resurfaced to provide a 22 foot wide double lane road. From MP 0.5 to MP 8.0, aggregate will be applied to create a 16 foot single lane road. Along this stretch, 30 to 40 foot long turnouts will be constructed at MPs 2.9, 3.8, 5.8, 7.1, and 7.35. From MP 8.0 to MP 11.6, through Bruce Meadows and Poker Meadows, the road will be raised at least 1 foot and then surfaced. From MP 11.6 to MP 12.0, through Ayers Meadows, geotextile will be placed on the existing road surface, which will be covered with 1 foot of imported material and the surfacing mixture. From MP 12.0 to MP 12.8, new turnouts will be constructed and 200 feet of road will be realigned at MP 12.6.

Operations will be managed with best management practices (BMPs) that minimize sediment delivery to water bodies. The BMPs may include straw bales, wattles, silt fences or mulches to prevent sediment movement. In addition, water will be used in blading operations to improve consolidation and compaction of the road surface. Raising of the road surface elevation within RHCAs will not be further restrict nearby streams from accessing their floodplains. Waste materials will not be sidecast within RHCAs and will be end hauled to an appropriate disposal location. Riprap for road stabilization will be limited to 100 linear feet per site and will not encroach upon the stream channel.

1.2.4 Road-Side Ditch and Relief Drainage Culvert Construction

Ditches will be constructed at a depth of 2 feet below the road grade through Bruce Meadows and Poker Meadows. In drier sections, ditches will be at a depth of 1 foot. Ditches will also be

constructed from MP 0.0 to MP 7.7, as necessary. Ditches will be armored on steep sections of road to reduce ditch line erosion. Culverts will be replaced and installed at a spacing of 150 feet to 400 feet apart through Bruce Meadows, Poker Meadows and Ayers Meadows. Culverts will also be placed from MP 0.0 to MP 8.0 as necessary. The BMPs to minimize sediment will be implemented during ditch and culvert construction.

1.2.5 Stream Culvert Replacement

Culverts at three sites, at the crossings on Cold Creek, Ayers Creek, and an unnamed tributary on Forest Road #579 near the junction of Forest Road #568, will be replaced. Stream-site culvert locations will be dewatered using cofferdams, pumping systems, and piping. As the area is dewatered, fish will be guided out of the area or salvaged, if necessary. Salvage will generally be conducted with nets, but some electroshocking may occur, especially in a large pool on the unnamed tributary. Some management approaches during the live-stream culvert replacement will reduce the effects of the construction. For example, erosion measures will be in place before construction begins, and an erosion control plan will be followed. Removal and installation of each new culvert will occur within an 8-hour period. Any intakes for pumps will use a 3/32-inch screen to reduce effects to fish.

The existing 3-foot culvert on Cold Creek will be replaced with a 5-foot diameter culvert that simulates a stream bottom. To allow for fish passage at all times during construction, a 24-inch diameter bypass culvert will be installed adjacent to the existing culvert and the flow will be redirected during culvert replacement. Water seeping into the installation site will be pumped into a settlement basin that will flow back into the natural channel downstream of the construction site. Riprap will be placed on each end of the culvert to anchor the structure and extend the simulated stream bottom an additional 5 feet upstream and downstream.

Three existing 18-inch diameter culverts on Ayers Creek will be replaced with three 24-inch diameter culverts spaced 20 to 40 feet apart along the road. Three separate culverts will be most effective at this site because this section of Ayers Creek does not have a defined channel. As each culvert is replaced, the flow will be routed through one of the other culverts using coffer dams and a pump. Water seeping into the installation area will be pumped into a settlement basin to keep the site dry. Fish passage will be available at all times.

The existing 46-inch by 57-inch by 30-foot culvert on the unnamed tributary will be replaced with a 46-inch by 57-inch by 44-foot culvert that will accommodate changes to the road. Cofferdams will be used to bypass the installation if the structure is installed when water is present. The SCNF confirmed on August 11, 2004, that the streambed at the site was dry, but the footprint of the culvert replacement may affect a nearby pool that is confirmed to have fish present.

1.2.6 Borrow Source Expansion

The aggregate borrow source site is located on the SCNF approximately 0.5 miles from State Highway 21. It is north of Forest Road #579, and outside the RHCA. This existing site is large enough to accommodate a rock crusher, shop trailer, power plant, two front-end loaders, a dozer, rock storage, and a dump truck turn around area. The excavation along large talus slopes would be expanded approximately 300 feet to the west to supply the rock for crushing. This site will also be used to pile and burn slash. Seasonal springs are present within the pit development area, and they will be contained by creating a sediment settlement basin and placing straw bales to capture sediment.

The fill material borrow source site is located on the BNF approximately 2 miles east southwest of the junction of Forest Roads #579 and #568. It is also outside the RHCA. The volume of borrow material will be approximately 15,000 cubic yards. This site will also be used to pile and burn slash.

1.2.7 Vegetation Clearing and Hazard Tree Removal

To improve driver sight distance and remove overhanging branches, vegetation will be cleared by chainsaw 5 feet along each side of the road from MP 0.0 to MP 7.7. Hazard trees, which are those trees that are infected by insects or disease or that outwardly show signs of imminent mortality, will be removed at a distance of 1 to 1.5 tree lengths from the road. All removed foliage, branches, limbs and non-commercial materials will be hauled to the aggregate borrow site or fill material borrow site for burning. The straight stretch 100 yards either side of MP 5.8 and a section extending from 50 feet in front of the Fir Creek crossing at MP 7.0 to MP 7.4 will be excluded from vegetation clearing due to their proximity to nearby water bodies. Limbs will be used for sediment control on sloped construction areas, and areas disturbed by vegetation clearing will be reseeded.

1.2.8 Future Activities

Periodic road grading and annual dust abatement (magnesium chloride) will be applied to the road surface to control dust and maintain the road surface. This Opinion covers future activities only within five years after the date of signature.

1.3 Description of the Action Area

An action area is defined by the Services' regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area affected by the proposed action includes the area that begins at

Cape Horn Summit and follows Cape Horn Creek along Forest Road #579, extending to the junction with State Highway 21 and beyond to the Cape Horn Creek confluence with Marsh Creek. This section of the action area also includes the aggregate borrow source site and its access road, located approximately 0.5 miles from State Highway 21 and north of Forest Road #579. The action area also extends from Cape Horn Summit and follows the Fir Creek drainage along Forest Road #579 to the confluence of Fir Creek with Bear Valley Creek. The action area continues along Forest Road #579, crossing Bruce Meadows, Cold Creek and some small streams. The action area includes approximately 2 miles of Forest Road #579 beyond the junction with Forest Road #568. This road will be used to access the fill material borrow source site, which is also included in the action area. The action area continues along Forest Road #568 across Wyoming Creek, Bear Valley Creek, Poker Meadows, Ayers Meadows and Ayers Creek. The action area also includes Bear Valley Creek from the bridge at Forest Road #568 down to the confluence with Marsh Creek. The fifth field hydrologic unit codes (HUCs) encompassing the action area from the Idaho Department of Fish and Game are 1706020508 and 1706020506 (Forest Service HUCs 1706020501 and 1706020503). This area serves as a migratory corridor for juveniles and adults, and spawning, rearing, and growth for the salmonid Evolutionarily Significant Units (ESUs) listed in Table 1.

2. ENDANGERED SPECIES ACT - BIOLOGICAL OPINION

The objective of this Opinion is to determine whether the Boundary Creek Road Project is likely to jeopardize the continued existence of the Snake River spring/summer chinook, Snake River Basin steelhead or destroy or adversely modify designated critical habitat.

2.1 Evaluating the Effects of the Proposed Action

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA. In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and, when appropriate, combines them with The Habitat Approach (NMFS 1999): (1) Consider the biological requirements and status of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species, and whether the action is consistent with any available recovery strategy; and (4) determine whether the species can be expected to recover under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages.[1] In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects

[1] The Habitat Approach is intended to provide guidance to NOAA Fisheries staff for conducting analyses, and to explain the analytical process to interested readers.

when added to the environmental baseline, is likely to jeopardize the ESA-listed species or result in the destruction or adverse modification of critical habitat. If jeopardy or adverse modification are found, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy and/or destruction or adverse modification of critical habitat.

The fourth step above (jeopardy/adverse modification analysis) requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (i.e., effects on essential features). The second part focuses on the species itself. It describes the action's effects on individual fish, populations, or both, and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to determine whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

2.1.1 Biological Requirements

The first step NOAA Fisheries uses when applying ESA section 7(a)(2) to the listed ESUs considered in this Opinion includes defining the species' biological requirements within the action area. Biological requirements are population characteristics necessary for the listed ESUs to survive and recover to naturally reproducing population sizes at which protection under the ESA would become unnecessary. The listed species' biological requirements may be described as characteristics of the habitat, population or both (McElhany *et al.* 2000). The annual targets in the Middle Fork Salmon are 7,400 adult Snake River Basin steelhead spawners and 9,300 adult Snake River spring/summer chinook salmon spawners. The chinook targets also include 911 chinook in Bear Valley index areas and 426 chinook in Marsh Creek index areas. These targets and those for other populations are explained on the NOAA Fisheries website (*http://www.nwr.noaa.gov/1habcon/habweb/habguide/bioptemplate_app_b.pdf*).

For actions that affect freshwater habitat, NOAA Fisheries may describe the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). The PFC is defined as the sustained presence of natural[2] habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999). The PFC, then, constitutes the habitat component of a species' biological requirements. Although NOAA Fisheries is not required to use a particular procedure to describe biological requirements, it typically considers the status of habitat variables in a matrix of pathways and indicators (MPI) (NMFS 1996) that were developed to describe PFC in forested montane watersheds. In the PFC framework, baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning."

[2] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon.

The Boundary Creek Road Project would occur within designated critical habitat for the Snake River spring/summer chinook salmon ESU. Essential features of critical habitat for the listed species are: (1) water quality, (2) substrate, (3) food (juvenile only), (4) safe passage conditions, (5) riparian vegetation, (6) water quantity, (7) water temperature, (8) water velocity, (9) cover/shelter, and (10) space. For this consultation, the essential features that function to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and growth and development to smoltification include water quality, substrate, food, safe passage conditions, and riparian vegetation. These essential features of critical habitat are included in the MPI (NMFS 1996) (discussed in more detail in Section 2.2.1).

2.1.2 Status and Generalized Life History of Listed Species

In this step, NOAA Fisheries also considers the current status of the listed species within the action area, taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species and also considers any new data that is relevant to the species' status. This section includes a discussion of the general life history of the listed species. Additional information on the species is available on the NOAA Fisheries website (*http://www.nwr.noaa.gov/1habcon/habweb/habguide/bioptemplate_app_a.pdf*) and in the status review updates (BRT 1998 and 2003).

NOAA Fisheries found that the Boundary Creek Road Project is likely to adversely affect the Snake River spring/summer chinook salmon, Snake River Basin steelhead, and designated critical habitat identified in Table 1. Based on the life histories of these ESUs, juvenile life stages of these listed species would be adversely affected by the Boundary Creek Road Project.

Table 1. References for additional background on listing status, critical habitat designation, protective regulations, and life history for the ESA-listed and candidate species considered in this consultation.

ESU	Status	Critical Habitat Designation	Protective Regulations	Life History
Snake River spring/summer chinook salmon (***Oncorhynchus tshawytscha***)	Threatened; April 22, 1992; 57 FR 14653[3]	October 25, 1999, 64 FR 57399[4]	July 10, 2000; 65 FR 42422	Matthews and Waples 1991; Healey 1991
Snake River Basin steelhead (***O. mykiss***)	Threatened; August 18, 1997; 62 FR 43937	Not designated[5]	July 10, 2000; 65 FR 42422	Busby *et al.* 1996; BRT 1998; Fish Passage Center 2001 and 2004

2.1.2.1 Snake River Spring/Summer Chinook Salmon

The Snake River spring/summer chinook salmon ESU, listed as threatened on April 22, 1992, (57 FR 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon Rivers. Some or all of the fish returning to several of the hatchery programs are also listed including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical habitat was designated for Snake River spring/summer chinook salmon on December 28, 1993, (58 FR 68543) and was revised on October 25, 1999, (64 FR 57399).

The Snake River drainage is thought to have produced more than 1.5 million adult spring/summer chinook salmon in some years during the late 1800s (Matthews and Waples 1991). Adult returns counted at Lower Granite Dam reached all-time lows at 1,797 in 1995, but numbers have been higher since 2000 than during the 24 previous years of record (Fish Passage Center 2004). Although there were record returns in 2001 and high returns in 2002 and 2003, numbers in general have been very low for the last several decades in comparison to historic levels (Bevan *et al.* 1994). Average returns of adult Snake River spring/summer chinook salmon are also low in comparison to interim target species recovery levels for the Snake River Basin (see *http://www.nwr.noaa.gov/1habcon/habweb/habguide/bioptemplate_app_b.pdf*). The low returns amplify the importance that a high level of protection be afforded to each adult chinook

[3] Also see June 3, 1992, 57 FR 23458, correcting the original listing decision by refining ESU ranges.

[4] This corrects the original designation of December 28, 1993, 58 FR 68543, by excluding areas above Napias Creek Falls.

[5] Critical habitat for Snake River Basin steelhead was designated on February 16, 2000, 65 FR 7764, but administratively withdrawn on April 30, 2002. Therefore, critical habitat is not designated at this time.

salmon, particularly because a very small percentage of salmon survive to return as spawning adults, and because these fish are in the final stage of realizing their reproductive potential (approximately 2,000 to 4,000 progeny per adult female).

Spawning and rearing habitats are commonly impaired in the range of this ESU through activities such as tilling, water withdrawals, timber harvest, grazing, mining, and alteration of floodplains and riparian vegetation. Mainstem Columbia River and Snake River hydroelectric developments have altered flow regimes and estuarine habitat, and disrupted migration corridors. Competition between natural indigenous stocks of spring/summer chinook salmon and spring/summer chinook of hatchery origin has likely increased due to an increasing proportion of naturally-reproducing fish of hatchery origin.

The exceptionally large numbers of adult chinook salmon that returned to the Snake River drainage from 2001 to 2003 are thought to be a result of favorable ocean conditions, and above average flows in the Columbia River Basin (CRB) when the smolts migrated downstream. However, these large returns are only a small fraction of the estimated returns of the late 1800s. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline. Detailed information on the range-wide status of Snake River chinook salmon under the environmental baseline, is described in chinook salmon status reviews (Myers *et al.* 1998 and BRT 2003). Habitat improvements would not necessarily correspond to increased salmon productivity because a myriad of other factors can also depress populations, but diminished habitat quality would probably correspond to reduced productivity (Regetz 2003).

Bear Valley Creek and Cape Horn Creek are considered important drainages for chinook salmon, and spawning occurs in both creeks. Smaller tributaries generally provide rearing habitat. Based on sampling conducted by the SCNF on August 16, 2004, juvenile chinook salmon are present in Cold Creek and Fir Creek. Although an unnamed tributary where a culvert replacement is proposed was dry at the time of sampling, a juvenile chinook was present in a local pool.

2.1.2.2 Snake River Basin Steelhead

The Snake River Basin steelhead ESU, listed as threatened on August 18, 1997, (62 FR 43937), includes all natural-origin populations of steelhead in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. One of the hatchery stocks in the Snake River Basin is listed (originating from Dvorshak Reservoir) under the B-Run Program (Pollard, pers. com. 2004), and several are included in the ESU. Critical habitat for Snake River Basin steelhead was designated on February 16, 2000, (65 FR 7764) but administratively withdrawn on April 30, 2002. Therefore, critical habitat is not designated at this time.

Natural runs of Snake River Basin steelhead have been declining in abundance over the past several decades. Some of the significant factors in the declining populations are mortality associated with the many dams along the Columbia and Snake Rivers, losses from harvest, loss

of access to more than 50 percent of their historic range, and degradation of habitats used for spawning and rearing. Possible genetic introgression from hatchery stocks is another threat since wild steelhead comprise such a small proportion of the population. Additional information on the biology, status, and habitat elements for Snake River Basin steelhead are described in Busby *et al.* (1996).

The 2000 through 2003 counts at Lower Granite Dam indicate a short-term increase in returning adult spawners. The three highest returns of adults (hatchery and wild) during 27 years of record occurred in 2001, 2002, and 2003 (Fish Passage Center 2004). Increased levels of adult returns are likely a result of favorable ocean and instream flow conditions for these cohorts. Although steelhead numbers have dramatically increased, wild steelhead comprise only 10-25% of the total returns since 1994. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline.

Survival of downstream migrants in 2001 was the lowest level since 1993. Low survival was due to record low run-off volume and elimination of spills from the Snake River dams to meet hydropower demands (Fish Passage Center 2001). Average downstream travel times for steelhead nearly doubled and were among the highest observed since recording began in 1996. Consequently, wide fluctuations in population numbers are expected over the next few years when adults from recent cohorts return to spawning areas. Detailed information on the current range-wide status of Snake River Basin steelhead, under the environmental baseline, is described in a steelhead status review (Busby *et al.* 1996) and the current status review update (BRT 2003).

Bear Valley Creek and Cape Horn Creek are considered important drainages for steelhead, and spawning occurs in both creeks. Smaller tributaries generally provide rearing habitat. Based on sampling conducted by the SCNF on August 16, 2004, rainbow trout are present in Cold Creek and Fir Creek. Although an unnamed tributary where a culvert replacement is proposed was dry at the time of sampling, fairly large rainbow trout were present in a pool. Some of the smaller rainbow trout may be juvenile steelhead.

2.1.3 Environmental Baseline in the Action Area

The environmental baseline is defined as: "The past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2, NOAA Fisheries' evaluates the relevance of the environmental baseline in the action area to the species' current status.

In general, the environment for listed species in the CRB, including those that migrate past or spawn upstream from the action area (as described in Section 1.3), has been dramatically affected by the development and operation of the Federal Columbia River Power System

(FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs, disturbing riparian areas and possibly stranding fish in shallow areas as flows recede. The
eight dams in the migration corridor of the Snake and Columbia Rivers kill or injure a portion of the smolts passing through the area. The low velocity movement of water through the reservoirs behind the dams slows the smolts' journey to the ocean and enhances the survival of predatory fish (Independent Scientific Group 1996, National Research Council 1996). Formerly complex mainstem habitats in the Columbia, Snake, and Willamette Rivers have been reduced, for the most part, to single channels, with floodplains reduced in size, and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 1984; Independent Scientific Group 1996; and Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997). In many watersheds, land management and development activities have: (1) elevated fine sediment yields, degrading spawning and rearing habitat; (2) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (3) reduced vegetative canopy that minimizes solar heating of streams; (4) reduced connectivity (*i.e.*, the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (5) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; (6) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; and (7) altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997).

To address problems inhibiting salmonid recovery in CRB tributaries, the Federal resource and land management agencies developed the *All H Strategy* (Federal Caucus 2000). Components of the *All H Strategy* commit these agencies to increased coordination and a fast start on protecting and restoring.

Pacific salmon populations also are substantially affected by variation in the freshwater and marine environments. Ocean conditions are a key factor in the productivity of Pacific salmon populations. Stochastic events in freshwater (flooding, drought, snowpack conditions, volcanic eruptions, etc.) can play an important role in a species' survival and recovery, but those effects

tend to be localized compared to the effects associated with the ocean. The survival and recovery of these species depends on their ability to persist through periods of low natural survival due to ocean conditions, climatic conditions, and other conditions outside the action area. Freshwater survival is particularly important during these periods because enough smolts must be produced so that a sufficient number of adults can survive to complete their oceanic migration, return to spawn, and perpetuate the species. Therefore it is important to maintain or restore essential features and PFC in order to sustain the ESU through these periods. Additional details about the importance of freshwater survival to Pacific salmon populations can be found in Federal Caucus (2000), NMFS (2000), and Oregon Progress Board (2000).

The area being evaluated for this project is adjacent to the Frank Church-River of No Return Wilderness along a route that is commonly used to access the Boundary Creek launch site for the Middle Fork Salmon River. The road is also used as a scenic shortcut between Stanley and Cascade. Streams in the action area include Bear Valley Creek, Ayers Creek, Fir Creek, Cold Creek, and Wyoming Creek in the Bear Valley watershed, and Cape Horn Creek in the Marsh Creek watershed. Marsh Creek and Bear Valley Creek combine to become the Middle Fork Salmon River. The mainstem reaches of Bear Valley Creek are primarily low gradient channels. The Bear Valley tributaries are primarily medium gradient channels, with low gradient channels in the lower meadow reaches within the project area, and some high gradient channels in isolated headwater areas outside the project area. The Cape Horn Creek stream reaches within the project area are primarily medium gradient channels, with low gradient channels located primarily below the project area near the stream's confluence with Marsh Creek.

The 30.7 mile long Bear Valley Creek has its headwaters to the southwest of the project area, where it first flows northwesterly and then takes an easterly course through the project area across Poker Meadows and Bruce Meadows before reaching its confluence with Marsh Creek. Forest Road #568 crosses Bear Valley Creek in Poker Meadows. Chinook salmon and steelhead spawn and rear in the lower and middle portions of Bear Valley Creek, including the project area.

Fir Creek is a small perennial stream with headwaters near Cape Horn Summit that flows northerly to its confluence with Bear Valley Creek in the lower reaches of Bruce Meadows. Forest Road #579 parallels the course of the stream for most of its 6.8 mile length.

Wyoming Creek is a small stream that flows for approximately 6.2 miles in a generally northerly direction to enter Bear Valley Creek within Bruce Meadows. Forest Road #579 parallels approximately 1 mile of the stream's 6.2 mile length. Forest Road #568 crosses the stream in Bruce Meadows. Wyoming Creek is classed as an intermittent stream which essentially flows subsurface near its mouth during winter, summer and fall months (Shapiro and Associates 2000).

Cold Creek is another small stream that flows in a northerly direction for approximately 4.2 miles before entering Bear Valley Creek downstream of Wyoming Creek. Cold Creek is

categorized as an intermittent stream, flowing subsurface in its lower reaches during the winter, summer and fall months (Shapiro and Associates 2000). Forest Road #579 crosses Cold Creek in Bruce Meadows near its confluence with Bear Valley Creek.

An unnamed tributary flows between Cold Creek and Wyoming Creek, where a culvert replacement is proposed. The tributary has seasonal flows that were observed on June 7, 2004, but the SCNF confirmed that the channel was dry on August 11, 2004 (Rose, pers. com. 2004). According to the BA, the U.S. Geological Survey map for this stream shows no surface water connection with Bear Valley Creek.

Ayers Creek is a small 3.9 mile long perennial stream that flows in a generally southwesterly direction through Ayers Meadow before entering Bear Valley Creek in Bruce Meadows. Forest Road #568 crosses Ayers Creek in its upper reaches as it enters Ayers Meadow.

Cape Horn Creek is a 9.4 mile long perennial stream with headwaters near Cape Horn Summit. The stream flows in an easterly direction through the project area, then turns and flows southwesterly to its confluence with Marsh Creek in the upper portions of Marsh Creek Meadows. The stream provides habitat for chinook salmon and steelhead. Forest Road #579 parallels approximately 2 miles of upper Cape Horn Creek in the project area.

Bear Valley Creek and Cape Horn Creek are both important drainages for anadromous and resident fisheries resources, although the number of chinook and steelhead spawners has decreased significantly from historic levels. These drainages provide some of the few remaining populations of exclusively wild, spring/summer chinook salmon. They are essentially free of hatchery influence. Summer steelhead utilizing these drainages are classified as wild B-run stocks, not supplemented by hatchery planting. In general, chinook salmon and steelhead are found in mainstem Bear Valley Creek and Cape Horn Creek. During an August 16, 2004, sampling by the SCNF, presence of chinook salmon and rainbow trout, which may be juvenile steelhead, was confirmed in Cold Creek, Fir Creek, and an unnamed stream where a culvert replacement is proposed. Ayers Creek and Wyoming Creek provide trout habitat and may also provide chinook salmon and steelhead rearing habitat. However, no fish were observed in Ayers Creek in the project area during the sampling. All of these streams and their riparian areas are designated critical habitat for Snake River spring/summer chinook salmon. The project area also supports populations of bull trout, westslope cutthroat trout, native redband/rainbow trout, introduced brook trout, mountain whitefish, Pacific lamprey, mottled sculpin, shorthead sculpin, redside shiner, speckled dace, longnose dace, and mountain sucker (Shapiro and Associates 2000).

Within the Bear Valley Watershed, threatened habitat indicators are streambank stability, substrate fines, water temperature, and large pools. Habitat quality has been degraded by the past effects of management activities such as mining, grazing and road construction. Riparian vegetation communities along mainstem portions of Bear Valley Creek and portions of some tributaries that were heavily grazed in the past have been altered. Historic riparian alteration has

led to channel destabilization and elevated bedloads that continue to affect stream channel stability today. Conversion from deep-rooted plant communities to shallow-rooted mesic vegetation types has reduced streamside resistance to erosion and trampling, and allowed for streambank destabilization. As the cohesive strength of the banks weaken, bank shearing, slumping and breakdown are frequently observed. In some areas, streambanks show a general lack of overhanging vegetation and undercut banks that provide cover for fish. Monitoring shows that riparian vegetation status is generally improving along the mainstem streams in Bear Valley. The grazing system implemented since 1993 appears to be reversing the decline in bank stability (Rose 2004). The presence of roads in the watershed may have increased the levels of sediment in water bodies. Chinook salmon and steelhead spawning habitats are closely associated with Lower Bear Valley Creek, which is now contained within an enclosure where livestock grazing is prohibited.

With the exception of the former Marsh Creek cattle pasture (outside the project area and ungrazed since 1992), habitat conditions for almost all stream segments within the Marsh Creek Watershed are considered at or near pristine condition (Rose 2004). Within the Cape Horn Creek drainage, road construction activities may have contributed to some degradation of aquatic habitats in areas parallel to the streamcourse. However, the limited available data indicates aquatic habitats are in good to excellent condition (Rose 2004). Habitat indicator elements, including water temperature, sediment/turbidity, chemical contaminants, habitat accessibility, large woody debris, pool frequency and quality, off-channel habitat, refugia, width-to-depth ratios, and floodplain connectivity are considered to be within the natural ranges of variability and functioning properly (Rose 2004). Disturbances within the watershed have not been of sufficient scope or magnitude to influence flow regimes or produce significant increases in drainage networks. Very little of the watershed is in timber stands which are less than 30 years old. Riparian habitats are considered to be in good to excellent condition (Jadlowski and Pisano 1993). The biological requirements of listed species are being met under the environmental baseline in the Marsh Creek watershed.

The biological requirements of the listed species are not being met under the environmental baseline in the Bear Valley Creek Watershed. Conditions in the action area would have to improve, and any further degradation of the baseline, or delay in improvement of these conditions would probably further decrease the likelihood of survival and recovery of the listed species under the environmental baseline. In particular, the streambank condition and road density and road location are considered to be functioning at a level of unacceptable risk.

2.2 Analysis of Effects

Effects of the action are defined as: "The direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential

for impairing the value of habitat for meeting the species' biological requirements or impairing the essential features of critical habitat. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or critical habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In step 3 of the jeopardy and adverse modification analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery. In watersheds where critical habitat has been designated, NOAA Fisheries must make a separate determination of whether the action will result in the destruction or adverse modification of critical habitat (ESA, section 3(3) and section 3(5A)).

2.2.1 Habitat Effects (which may also affect listed species)

NOAA Fisheries will consider any scientifically credible analytical framework for determining an activity's effect. In order to streamline the consultation process and to lead to more consistent effects determinations across agencies, NOAA Fisheries, where appropriate, recommends that action agencies use the MPI and procedures in NMFS (1996), particularly when their proposed action would take place in forested montane environments. NOAA Fisheries is working on similar procedures for other environments. Regardless of the analytical method used, if a proposed action is likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC, it cannot be found consistent with conserving the species.

For the streams typically considered in salmon habitat-related consultations, a watershed is a logical unit for analysis of potential effects of an action (particularly for actions that are large in scope or scale). Healthy salmonid populations use habitats throughout watersheds (Naiman *et al.* 1992), and riverine conditions reflect biological, geological and hydrological processes operating at the watershed level (Nehlsen 1997; Bisson *et al.* 1997; and NMFS 1999).

Although NOAA Fisheries prefers watershed-scale consultations due to greater efficiency in reviewing multiple actions, increased analytic ability, and the potential for more flexibility in management practices, often it must analyze effects at geographic areas smaller than a watershed or basin due to a proposed action's scope or geographic scale. Analyses that are focused at the scale of the site or stream reach may not be able to discern whether the effects of the proposed action will contribute to or be compounded by the aggregate of watershed impacts. This loss of analytic ability typically should be offset by more risk averse proposed actions and ESA analysis in order to achieve parity of risk with the watershed approach (NMFS 1999).

The Boundary Creek Road Project BA provides an analysis of the effects of the proposed action on Snake River spring/summer chinook salmon, Snake River Basin steelhead, and designated critical habitat for chinook salmon in the action area. The analysis uses the MPI and procedures in NMFS (1996), the information in the BA, and the best scientific and commercial data available to evaluate elements of the proposed action that have the potential to affect the listed fish or essential features of designated critical habitat.

Potential habitat effects of existing roads, construction of roads and reconstruction of roads on fisheries are related primarily to impacts on stream substrates, water quality, fish migration opportunities, riparian area integrity, and stream channel integrity. Specific habitat effects which may result from the project include: (1) diminished water quality and riparian vegetation condition; (2) leaks from fuels or chemicals; (3) sediment generated by raising and surfacing the roadbed, installing relief drainage culverts, ditches, borrow pit activities, and instream work to replace culverts on Cold Creek, Ayers Creek and an unnamed tributary to Bear Valley Creek; and (4) the clearing of vegetation. The action area includes spawning habitat in Bear Valley Creek and Cape Horn Creek that may be affected. However, the habitat most likely to be affected is juvenile rearing habitat, where project-specific activities will occur. The Bear Valley Roads Project is considered an interrelated activity in this analysis. The action area of the Bear Valley Roads Project does not overlap the action area of the Boundary Creek Road Project action area; therefore, there will be no measurable downstream effects from the Bear Valley Roads Project that contribute to the effects from the Boundary Creek Road Project.

Specific habitat effects are discussed below by the essential features of critical habitat most important to supporting the species in the action area: water quality, substrate, food, safe passage conditions, and riparian vegetation.

2.2.1.1 Water Quality

Dust suppressants are generally applied to high traffic roads to reduce nuisance dust levels and improve driver safety. Dust suppressants help maintain the surface of unpaved roads, reduce the production of sediment caused by road-surface rutting and limit the need for frequent road-surface maintenance. Inorganic chloride salts such as magnesium chloride dissociate into the chloride anion and magnesium cation in the environment. These compounds may enter surface water and groundwater due to careless application, runoff, leaching through the soil, windblown dust particles, splash, and spray. Effects of chloride ions on aquatic biota have been documented at exposures as low as 400 milligrams per liter (mg/l) for non-lethal effects, or approximately 1,000 mg/l for median lethal effects on rainbow trout (Environment Canada and Health Canada 2000). About 5 percent of aquatic species would be affected at chloride concentrations of about 210 mg/l, and 10 percent of species would be affected at concentrations of 240 mg/l (Environment Canada and Health Canada 2000). The U.S. Environmental Protection Agency has set a National Secondary Drinking Water Regulations standard of

250 mg/l (EPA 1988). Generally, the impact on water quality is negligible if a suitable buffer (*i.e.*, 25 feet) is maintained between the road surface and flowing water (Bolander and Yamada 1999). The SCNF has proposed a 25 foot buffer.

The LC50 test, which measures the lethal concentration of a product in parts per million that produces a 50 percent mortality rate in a test group of specimens over a 96 hour period, is the standard test for measuring toxicity of chemicals on plants and animals. Rainbow trout have a 96-hour LC50 of 9,000 ppm for 35 percent magnesium chloride (Heffner 1997).

The SCNF has proposed placing berms along road sections specified in Section 1.2.1 to prevent surface flow and overspray introduction of magnesium chloride into water bodies. However, groundwater and subsurface infiltration into water bodies is likely to occur, which would allow fish species to be exposed to magnesium chloride. Bolander and Yamada (1999) recommend that magnesium chloride application be restricted within 25 feet of water bodies and monitor chloride migration to the water table.

Other measures will be taken to prevent lethal or sub-lethal levels of magnesium chloride from entering project area waters. Good surface preparation and multiple pass application will minimize runoff and promote integration of magnesium chloride. There will be monitoring of water quality during application of the magnesium chloride as well as immediately after and, if possible, during heavy rainfalls. The SCNF shall reinitiate consultation for the project and immediately stop application of the magnesium chloride in the event the monitoring identifies a fisheries concern. If water quality monitoring indicates 400 ppm or greater for magnesium chloride, the SCNF will reinitiate consultation and stop the application of magnesium chloride to the road surface.

The monitoring of water quality, treatment methods, and restrictions on magnesium chloride treatments reduce the likelihood that salmonids and their habitat will be significantly affected and reduce the potential magnitude of effects that do occur. Effects of magnesium chloride applications to salmonids will likely be greatest along Cape Horn Creek and tributaries to Bear Valley Creek, especially in locations adjacent to roads. Bear Valley Creek would be less affected. Any negative effects to salmonids have the potential to continue occur over time with the repeated treatments of magnesium chloride on the roads.

Operation of heavy equipment requires the use of fuel, lubricants and other chemicals, which can injure or kill aquatic organisms if spilled into a waterbody or into the adjacent riparian zone. Accidental releases of fuel, oil, and other contaminants may occur during operation of backhoes, excavators, and other equipment. Petroleum-based contaminants contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also cause chronic sublethal effects to aquatic organisms (Neff 1985).

Excavation in the stream channel associated with the culvert work will elevate the risk for chemical contamination of the aquatic environment within the action area. Because the potential

for chemical contamination should be localized and brief, the probability of direct mortality is negligible. Work area isolation will minimize the risk from chemical contamination during instream work activities. All equipment, prior to arrival at the project site, will be free of oil, fuel, or toxic leaks that could wash contaminants into the water. Activities involving potential pollutants will be conducted with sufficient containment measures to ensure that these materials will not be introduced into streamcourses. The possibility of fuel or other contaminants reaching live waters in the event of an accidental spill will be minimized by BMPs and mitigation measures. A spill could have some long-term effects, depending on the type of substance involved in the spill, but the effects would be expected to decrease over time.

2.2.1.2 Substrate

When sediment delivery exceeds a stream's sediment transport capabilities, the amount of fine sediments increase on and within stream substrates. Salmonid populations are typically negatively correlated with the amount of fine sediment in stream substrate (Chapman and McLeod 1987). Excessive concentrations of fine sediments in spawning and rearing habitats can reduce survival of embryos and alevins by entombing embryos and reducing flow of dissolved oxygen, decrease the availability of interstitial hiding places, alter production of macroinvertebrates, and reduce total pool volume (various studies summarized in Spence *et al.* 1996). Egg deposition and survival are reduced when sediment fills the interstitial spaces between gravels and prevents the flow of oxygen and the flushing of metabolic wastes. Fine sediment deposited in stream substrates is directly related to chinook salmon egg-to-fry survival.

Rearing areas are diminished as sediment fills pools and other areas. Sedimentation of deep pools and coarse substrate used for rearing and overwintering limits the space available for fish. Increased sediment load can be detrimental to juvenile salmon not only by causing siltation, but also by introducing suspended particulate matter that interferes with feeding and territorial behavior (Berg and Northcote 1985). Salmonid physiological responses to high suspended sediment exposure include mucus production on gills and "coughing" to facilitate sloughing of fine particles (Bams 1969). A study by Everest *et al.* (1987) concluded that all salmonid species can tolerate the natural variability in sediments, yet their populations can be reduced by persistent sedimentation that exceeds the natural range of variability under which they evolved.

Reduction of elevated sedimentation rates which are due to the current condition of the current Boundary Creek road has been identified as an important element of the purpose and need of this project. The reconstruction and resurfacing work, in combination with magnesium chloride applications, should reduce road surface sediment runoff by 80 to 90 percent (Rose 2004). The proposed action would likely cause a short-term increase in turbidity and sedimentation of the substrate at and below the work site, and could temporarily displace fish using the area for rearing. The elements of the project that have the potential to negatively affect substrate are roadbed raising and resurfacing, culvert replacements, borrow source expansion, and vegetation clearing.

Turbidity created from the culvert replacements, including the placement and removal of cofferdams, could temporarily diminish juvenile salmonid feeding downstream. Increased turbidity and sediment levels are likely to exceed the natural background levels during construction in each stream and when water is returned to the main channel after culvert replacement. Excavation and replacement of road fills and stream channel materials may temporarily increase stream turbidity and sedimentation when these activities are conducted adjacent to water bodies. Sediment from borrow pit areas or from areas where vegetation is cleared may also flow into streams. Fish affected by turbidity may temporarily or permanently leave the area to avoid its effects. Mortality from turbidity is not expected to occur because the extent of turbid flows is likely to be short-term and localized. Similarly, effects from road reconstruction would be limited to temporary, localized increases in sediment delivery to Bear Valley Creek, its tributaries, and Cape Horn Creek.

Hydrologic function should be increased by reducing the probability of culvert failures and by re-establishing more natural patterns of bedload and woody debris movement. The new culverts are designed to accommodate a 100-year flood event and channel substrate materials should deposit on the bottom of the culverts. The new culverts will likely reduce migration impediments to steelhead, chinook salmon, and other aquatic organisms. The road improvements are designed to reduce sediment delivery, and the connectivity within the wet meadow areas will likely increase due to the addition of relief culverts. Project activities may have a minor localized beneficial influence on pool frequency and quality, particularly within the Bruce Meadows and Ayers Meadow reaches, by effecting a long-term reduction in sediment delivery and thus reducing the potential for pool degradation.

Sediment should have a minimal effect on redds in Bear Valley Creek or Cape Horn Creek because project work will occur at a distance from these water bodies and any sediment plumes will likely be greatly attenuated upstream of spawning areas. Construction during low water conditions and the use of BMPs will minimize the amount of sediment introduced to the water column and the stream substrate. Sediment produced from project activities will likely have a short-term negative effect on rearing habitat.

Based on the effects described above, the proposed actions will have short-term adverse effects and long-term beneficial effects on steelhead and chinook habitat in the action area. The production capacity of both steelhead and chinook salmon is expected to increase in the action area as a result of the proposed action. However, changes in lambda, as a result of the restoration activities, cannot be quantified since the expected incremental change in egg-to-smolt survival in the action area is unknown.

2.2.1.3 Food

Sedimentation and the introduction of chemicals, such as magnesium chloride or fuels, may negatively affect invertebrates, resulting in a reduction of the food supply for salmon and steelhead (Spence *et al.* 1996). The major effect upon benthic invertebrates is the smothering of physical habitat by heavy sediment deposition on the streambed, including the loss of interstitial space occupied by burrowing or hyporheic animals (Waters 1995). Sediment will likely be released in the short-term, but should be reduced over the long-term. The effects of sediment on the food supply is not likely be significant or long-lasting. The long-term reduction in sediment may eventually enhance the food supply.

The Boundary Creek Road Project may result in the release of chemicals, such as magnesium chloride over an extended period of time. The effects of magnesium chloride or other chemicals on the fish food supply is difficult to quantify because the amount of material interacting with the water body is unknown.

The BMPs used in the application of magnesium chloride for dust abatement should help reduce the negative effects on fish prey. However, the impacts would be negligible if a suitable buffer were developed (Bolander and Yamada 1999). Dust abatement treatments are also likely to reduce the amount of sediment delivery over the long-term, which may have a positive effect on food supplies for salmonids. The BMPs used to reduce sediment delivery during project implementation will likely limit the negative effects to salmonid prey items.

2.2.1.4 Safe Passage Conditions

Providing safe passage conditions is important for salmonids in all life stages. Project activities will have an overall beneficial influence on physical barriers by improving fish passage at the culvert sites on Cold Creek, Ayers Creek, and maintaining passage at an unnamed tributary to Bear Valley Creek. Fish passage will be provided during culvert replacement activities, although levels of sediment are likely to discourage fish movement through the vicinity. The installation of additional relief culverts throughout the road may also facilitate passage for any fish that use the wet meadow areas during the wettest seasons. The positive and negative effects on salmonid passage are only likely to impact juveniles because other life stages occur downstream of any barriers. Negative effects should not be long-lasting due to the short duration of work for the different project elements.

2.2.1.5 Riparian Vegetation

Woody riparian vegetation provides large wood to streams, which encourages the creation of rearing and spawning areas. Riparian vegetation also provides water quality functions (*e.g.*,

temperature control and nutrient transformation), bank stability, detritus (insect and leaf input, small wood for substrate for insects), microclimate formation, floodplain sediment retention and vegetative filtering, and recharge of the stream hyporheic zone (Spence *et al.* 1996).

Streamside vegetation benefits to aquatic communities can include overhanging cover and shade, cool water temperature, and large woody debris recruitment, leading to increased instream cover and water depth. Other benefits of a fully functioning riparian community include increased bank stability and complexity, buffers and filters for erosion control and reduced sediment delivery, and a source of terrestrial food for fish (Spence *et al.* 1996).

Vegetation will be removed along the side of the existing road. Two sections of road, as explained in Section 1.2.7, have been excluded from these treatments based on their proximity to water bodies. Based on this exclusion, the vegetation removal is not considered likely to have a significant effect on the function of riparian vegetation for salmonid species.

Magnesium chloride applications can have an effect on nearby vegetation, especially species sensitive to chloride, such as pines, but the impact to vegetation becomes negligible if a suitable buffer is maintained between the road surface and flowing water (Bolander and Yamada 1999). Magnesium chloride treatments will generally occur away from water bodies, but some streamside riparian vegetation may be affected as the chemicals infiltrate the soil. The likelihood for magnesium chloride treatments to have a significant effect on riparian vegetation in sections of road that are away from water bodies is unknown. Riparian vegetation in sections of road that are near water bodies is likely to be negatively affected, even if berms are used to prevent surface flow and overspray effects.

2.2.2 Species Effects

The Boundary Creek Road Project will likely have short-term negative effects on salmon and steelhead due to the application of magnesium chloride, sedimentation, and other habitat effects. However, the project should have long-term positive effects on the survival and recovery of Snake River spring/summer chinook salmon and Snake River steelhead by improving fish passage and reducing sediment contributions from roads into streams. However, these long-term positive effects are somewhat offset by the long-term negative effects that may occur through magnesium chloride applications.

The effect that a proposed action has on particular essential features or MPI pathways can be translated into a likely effect on population growth rate. In the case of this consultation it is not possible to quantify an incremental change in survival for Snake River spring/summer chinook salmon and Snake River Basin steelhead.

While population growth rates have been calculated at the large ESU scale, changes to the environmental baseline from the proposed action were described only within the action area

(typically a watershed). An action that improves habitat in a watershed, and thus helps meet essential habitat feature requirements, may therefore increase lambda (*i.e.*, the annual rate of population change) for the population of the ESU in the action area.

Fish salvage will likely occur as part of the culvert replacement activities, particularly on Cold Creek and the unnamed tributary. Through fish salvage, there is a likelihood for take of juvenile chinook salmon and steelhead. During any salvage operation, there is the possibility of lethal take of fish. For example, the Idaho Department of Fish and Game (IDFG) salvaged 2,886 juvenile chinook and steelhead in 31 separate operations within the Lemhi watershed in 2003 (Resseguie, 2004). Of these, 2,729 were non-lethal take. The salvage area for culvert replacements will be much smaller on average than those conducted by the IDFG in the Lemhi watershed. Fish densities have not been determined for the streams where the culvert replacements will occur, but the SCNF sampling on August 16, 2004, found three chinook on Cold Creek, one chinook on the unnamed tributary, small numbers of rainbow trout (*i.e.*, possible steelhead) on each creek, and no fish on Ayers Creek (Rose, pers. com. 2004). More fish would likely be found through a more rigorous study. Based on these assumptions, a reasonable estimate of non-lethal take (salvage) for the salvage efforts on the Boundary Creek Road Project would be 30 juvenile Snake River spring/summer chinook salmon or steelhead. Additionally, NOAA Fisheries anticipates that lethal take resulting from the action will be no more than three juvenile Snake River spring/summer chinook salmon or steelhead.

Adverse effects on individual fish can reduce population recruitment rates of Snake River spring/summer chinook salmon and Snake River steelhead by a small increment. The short-term adverse effects of the project will likely be minimized through conservation measures. However, the potential for adverse effects on these populations remains a concern. The genetically unique steelhead population in the Middle Fork Salmon River subbasin, and the spring/summer chinook salmon population, currently are below their historic abundances and interim targets for recovery. Even small incremental reductions in these populations can reduce the likelihood of their survival over the long-term.

Based on the effects described above, the Boundary Creek Road Project should have a net positive effect on the survival and recovery of Snake River spring/summer chinook salmon and Snake River Basin steelhead. Although quantifying the change in survival resulting from the Boundary Creek Road Project is not possible due to other activities in the watershed, reductions in sediment like those associated with this project are known to improve salmonid habitat and survival. Changes in populations resulting from the Boundary Creek Road Project and other watershed activities will be measurable in increased number of redds and increases in outmigrations for chinook and steelhead and should offset the potential loss of three spring/summer chinook or steelhead.

2.2.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." These activities within the action area also have the potential to adversely affect the listed species and critical habitat. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations have been added to the description of the environmental baseline in the action area.

State, tribal, and local government actions will likely be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses, including ownership and intensity, any of which could adversely affect listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties.

Changes in the economy have occurred in the last 15 years, and are likely to continue, with less large-scale resource extraction, more targeted extraction, and significant growth in other economic sectors. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water supplies, waste-disposal sites, and other infrastructure.

Economic diversification has contributed to population growth and movement, and this trend is likely to continue. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated.

No state or private lands are located within the Bear Valley Watershed. The Bruce Meadows Airstrip is a state-operated emergency landing field that is sometimes used by air travelers going on Middle Fork Salmon River float trips. The dirt strip is occasionally bladed but the flat topography and buffer of the ungrazed meadow vegetation probably prevents any movement of sediment to area streams. The Marsh Creek Watershed has some non-Federal lands, but they are located outside of the action area and Cape Horn Creek. NOAA Fisheries is not aware of any new non-Federal activities that are reasonably certain to occur in the action area. Effects of ongoing non-Federal actions upon fishery resources and fish habitats are generally insignificant and mostly confined to state, private, or tribal activities within the boundaries of Federal lands. Ongoing actions include: (1) recreational use, (2) hunting, (3) dispersed camping, and

(4) outfitter and guide services. These activities are expected to continue to occur at current levels, or in some cases, increased levels. They are not expected to contribute to substantial adverse cumulative effects to fisheries resources or aquatic habitats within the analysis area.

2.2.4 Consistency with Listed Species ESA Recovery Strategies

Recovery is defined by NOAA Fisheries regulations (50 CFR 402) as an "improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4 (a)(1) of the Act." Recovery planning is underway for listed Pacific salmon in the Northwest with technical recovery teams identified for each domain. Recovery planning will help identify measures to conserve listed species and increase the survival of each life stage. NOAA Fisheries also intends that recovery planning identify the areas/stocks most critical to species conservation and recovery and thereby evaluate proposed actions on the basis of their effects on those areas/stocks.

Until the species-specific recovery plans are developed, the FCRPS Opinion (NMFS 2000) and the related December 2000 *Memorandum of Understanding Among Federal Agencies Concerning the Conservation of Threatened and Endangered Fish Species in the Columbia River Basin* (together these are referred to as the Basinwide Salmon Recovery Strategy) provides the best guidance for judging the significance of an individual action relative to the species-level biological requirements. In the absence of completed recovery plans, NOAA Fisheries strives to ascribe the appropriate significance to actions to the extent available information allows. Where information is not available on the recovery needs of the species, either through recovery planning or otherwise, NOAA Fisheries applies a conservative substitute.

The SCNF has specific commitments to uphold under the Basinwide Salmon Recovery Strategy (see *http://www.nwr.noaa.gov/1habcon/habweb/habguide/bioptemplate_app_b.pdf*). For Federal lands, PACFISH, the Northwest Forest Plan, and land management plans define these commitments. Below are some relevant commitments from the Basinwide Salmon Recovery Strategy.

- Ensure that land managers consider the broad landscape context of site-specific decisions on management activities by requiring a hierarchically-linked approach to analysis at different geographic scales. This is important to ensuring that the type, location and sequencing of activities within a watershed are appropriate and done in the context of cumulative effects and broad scale issues, risks, opportunities and conditions.

- Consult with NOAA Fisheries on land management plans and actions that may affect listed fish species following the Streamlined Consultation Procedures for section 7 of the ESA, July, 1999.

- Cooperate with the other Federal agencies (in particular NOAA Fisheries and USFWS), states and tribes in the development of recovery plans and conservation strategies for listed and proposed fish species. Require that land management plans and activities be consistent with approved recovery plans and conservation strategies.

- Collaborate with other Federal agencies, states and tribes to improve integrated application of agency budgets to maximize efficient use of funds towards high priority restoration efforts on both Federal and non-Federal lands.

- Collaborate with other Federal agencies, states and tribes in monitoring efforts to assess if habitat performance measures and standards are being met.

- Require that land management decisions be made as part of an ongoing process of planning, implementation, monitoring and evaluation. Incorporate new knowledge into management through adaptive management.

The Boundary Creek Road Project will reduce sediment as part of an effort to improve land management and fish habitat. For this reason, the proposed action is consistent with the specific commitments and primary objectives of the Basinwide Salmon Recovery Strategy.

2.3 Conclusions

The fourth step in NOAA Fisheries' approach to determine jeopardy and adverse modification of critical habitat is to determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival and recovery in the wild or adversely modify or destroy critical habitat. For the jeopardy determination, NOAA Fisheries uses the consultation regulations and, where appropriate, The Habitat Approach (NMFS 1999) to determine whether actions would further degrade the environmental baseline or hinder attainment of PFC at a spatial scale relevant to the listed ESU. The analysis must be applied at a spatial resolution wherein the actual effects of the action upon the species can be determined. The first part of the two-part analysis required in the fourth step is represented below in the summary of the effects on critical habitat and the listed species in the action area. The second part of the analysis places critical habitat and the species effects in the context of the ESU as a whole. In reaching the determinations, NOAA Fisheries used the best available scientific and commercial data to analyze the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects.

2.3.1 Critical Habitat Conclusion

The essential features of water quality, substrate, food, safe passage conditions, and riparian vegetation are all likely to be affected by the Boundary Creek Road Project. However, the

negative effects to the essential features, including release of sediment and other chemicals, will be part of the process to improve critical habitat. They will also be of limited duration and spatial extent. If the project is implemented as described in the BA, which includes relevant conservation measures, these negative effects are outweighed by the short- and long-term beneficial effects of the project. The proposed action is not likely to impair properly functioning habitat, not likely to appreciably reduce the functioning of already impaired habitat, and not likely to retard the long-term progress of impaired habitat toward PFC. The Boundary Creek Road Project does not compound existing habitat problems with the environmental baseline or anticipated problems from cumulative effects occurring in the action area. The proposed action is consistent with the specific habitat-based commitments and primary objectives of the Basinwide Salmon Recovery Strategy.

After reviewing the current condition of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the Boundary Creek Road Project is not likely to destroy or adversely modify their critical habitat.

2.3.2 Species Conclusion

The proposed action could cause minor, short-term degradation of anadromous salmonid habitat, and harassment or harm of juveniles from increases in sedimentation and turbidity. NOAA Fisheries expects that construction-related effects and work isolation activities could temporarily alter normal feeding and sheltering behavior of juvenile steelhead or chinook salmon during the proposed action. NOAA Fisheries also expects beneficial water quality and hydrologic effects from the replacement of stream culverts and reconstructed road. Because of application methods and monitoring, magnesium chloride levels should not reach the level at which toxic non-lethal effects occur to chinook salmon and steelhead, but unmeasurable effects may occur. Based on these habitat effects, the proposed action will not reduce survival of Snake River spring/summer chinook salmon and Snake River Basin steelhead. The road project covers a relatively small portion of the watershed, and the short-term negative effects on salmonid species should be more than compensated for in the long-term. Any increases in sedimentation and turbidity in the project reach will be short-term and relatively minor, and would not change or worsen existing conditions for stream substrate in the action area.

The salvage operation and instream work will likely involve some take of juvenile chinook and steelhead in the Bear Valley watershed, but based on past experience (Resseguie, 2004), a significant portion of juveniles will survive these adverse effects. NOAA Fisheries anticipates non-lethal take of up to 30 juvenile Snake River spring/summer chinook salmon or steelhead and the lethal take of no more than three juvenile Snake River spring/summer chinook salmon or steelhead.

Project work is not sufficient to reduce all juvenile chinook and steelhead populations to the point that the species cannot recover. Based on the density of juvenile chinook and juvenile steelhead in Bear Valley Creek, there is a ratio of 79% chinook and 21% steelhead (Shapiro and Associates 2000). Assuming lethal take of three fish, this would result in 2.4 chinook juveniles and 0.6 steelhead juveniles being killed.

The number of young chinook salmon produced by each spawning chinook has remained fairly constant over the last several decades in the Middle Fork Salmon River Basin (Thurow 2000b). Based on research in the 1960s, each spawning female chinook in Bear Valley Creek produces 5,700 eggs (IDFG 1990). From 1995 to 1998, there were an average of 48 chinook redds on Bear Valley Creek and an average of 28 redds on Marsh Creek (Thurow 2000a). In 2003 alone, there were 364 chinook redds on Bear Valley Creek and 335 redds on Marsh Creek (IDFG 2003). The 2004 chinook redd counts appear to be reduced from the numbers in 2003 (Brimmer, pers. com. 2004). Using the conservative figures from the late 1990s production, there would be 48 chinook redds on Bear Valley Creek, which would produce 273,600 eggs (48 redds x 5,700 eggs). Chinook egg-to-parr survival rates in Bear Valley Creek are 1.2%, and parr-to-smolt survival is estimated at 26% for the Salmon, Clearwater and upper Snake River subbasins (Petrosky 1990). So, chinook egg-to-smolt survival in Bear Valley Creek is estimated at 0.312% (1.2% x 26%). An estimate for juvenile chinook escapement from Bear Valley Creek is 854 (0.312% x 273,600 eggs). This figure seems somewhat reasonable since annual juvenile escapement of Snake River spring/summer chinook salmon from Marsh Creek ranged from 10,000 to 130,000 during the 1970s (Bjornn 1990) and production has decreased since then (Thurow 2000b). A lethal take of 2.4 chinook equates to 0.0028 (2.4/854) of the total spring/summer chinook juvenile escapement from Bear Valley Creek. Based on redd counts, Bear Valley Creek produces approximately 16% of the Middle Fork Salmon River chinook population (Thurow 2000a). Therefore, the death of 2.4 chinook from Bear Valley Creek would be a very small loss within the context of the Middle Fork Salmon River Subbasin. Additionally, the Middle Fork is only one of several subbasins that constitute habitat for Snake River spring/summer chinook salmon.

Certain data for steelhead, such as fecundity and stream-specific escapements, are not available, but spawning escapements (*i.e.*, returning fish) to the Middle Fork Subbasin were believed to be about 2,000 fish around 1990 (IDFG 1990). Even when using spawning escapement as a substitute for juvenile escapement, the lethal take of 0.6 steelhead would equate to 0.0003 (0.6/2,000) of the total Middle Fork spawning escapement. This number is very small, particularly given that the Middle Fork is only one of several subbasins that constitute habitat for Snake River Basin steelhead

After reviewing the current status of Snake River spring/summer chinook salmon and Snake River Basin steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the Boundary Creek Road Project is not likely to jeopardize the continued existence of Snake River spring/summer chinook salmon and Snake River Basin steelhead.

2.4 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. NOAA Fisheries worked with the SCNF to incorporate measures to avoid or minimize adverse effects of the proposed activities. Therefore, NOAA Fisheries has no additional conservation recommendations regarding the actions addressed in this Opinion.

2.5 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: (1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation.

Because magnesium chloride can have toxic effects that reduce the survival and production of spring/summer chinook salmon and steelhead, magnesium chloride monitoring is required in this Opinion. Additionally, because sediment deposition is correlated to the survival and production of spring/summer chinook salmon and steelhead and the proposed action is likely to deliver sediment to streams in the action area, sediment monitoring is required in this Opinion (refer to Section 2.6.3). Consultation must be reinitiated if any of the following conditions occur: (1) monitoring shows that magnesium chloride levels reach 400 ppm; (2) monitoring shows that the placement or removal of cofferdams for the culvert replacements, or road construction activities near streams, creates a sediment plume extending more than 100 yards from the activity; (2) non-lethal take of Snake River spring/summer chinook salmon and/or steelhead exceeds 30 fish; or (3) lethal take of Snake River spring/summer chinook salmon and/or steelhead exceeds three fish.

2.6 Incidental Take Statement

The ESA at section 9 (16 USC 1538) prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule (50 CFR 223.203). Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532(19)). Harm is defined by

regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering" (50 CFR 222.102). Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR 17.3). Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR 402.02). The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement (16 USC 1536).

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures (RPMs) that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the RPMs.

2.6.1 Amount or Extent of Take

The proposed action is reasonably certain to result in incidental take of the listed species. NOAA Fisheries is reasonably certain the incidental take described here will occur because: (1) the listed species are known to occur in the action area; (2) the proposed action is likely to cause impacts to critical habitat significant enough to impair feeding, breeding, migrating, or sheltering for the listed species; and (3) the proposed action includes instream work that could harm or kill juvenile chinook salmon or steelhead.

Based on the discussion in Section 2.2.2, NOAA Fisheries anticipates salvage efforts conducted for culvert replacements will result in the non-lethal take of 30 juvenile Snake River spring/summer chinook salmon or steelhead and lethal take of three juvenile Snake River spring/summer chinook salmon or steelhead. The take of adult chinook salmon and steelhead, as well as their incubating eggs, in not anticipated.

Despite the use of best scientific and commercial data available, NOAA Fisheries cannot quantify a specific amount of incidental non-lethal take of individual juvenile fish for this action other than for the salvage operation. Effects of actions such as minor riparian disturbance are unquantifiable in the short-term, and are not expected to be measurable. Take is not anticipated for actions such as road reconstruction, borrow pit activities, and vegetation clearing due to mitigation measures built into the BA.

No measurable take associated with magnesium chloride is anticipated so long as levels remain below 400 ppm, the level at which non-lethal toxic effects to aquatic biota begin to occur. However, take may occur that is unmeasurable due to uncertainty about the effects of

magnesium chloride and uncertainty about the number of fish likely to be present. In lieu of an amount of take, NOAA Fisheries identifies the extent of take (*e.g.*, the specific area in which take is expected to occur). The extent of unmeasurable take from magnesium chloride applications is anticipated to include the aquatic and associated riparian habitats affected by the actions, extending upstream to the edge of disturbance and downstream from all affected tributaries to the confluence of Fir Creek with Bear Valley Creek and downstream one-half mile from the State Highway 21 crossing of Cape Horn Creek. Magnesium chloride levels within this area are only authorized to reach 400 ppm. The take should only occur for up to five years of applications.

Sediment created by the proposed activities is likely to harm or kill Snake River spring/summer chinook salmon or steelhead by altering habitats required for growth and reproduction. The amount of this expected take of Snake River spring/summer chinook and steelhead resulting from sediment releases during the cofferdam installation and removal cannot be quantified in this instance because: (1) The number of fish present in the action area is unpredictable because fish population sizes are likely to change due to year-to-year variation, and fish densities in a given location vary from transitory residence and movement among different stream reaches; (2) the amount of sediment created by from this work is highly variable and cannot be predicted quantitatively; and (3) the degree of effects (lethal and sublethal) that sediments have on salmonids and their habitats depends on stochastic factors that dictate where, when, and how much sedimentation occurs within a stream system, and whether or not fish are present at those places and times when sediment deposition is large enough to have adverse effects. In lieu of an amount of take, NOAA Fisheries anticipates the extent of non-lethal juvenile related to sediment will extend from the location of active project activities to downstream 100 yards.

2.6.2 Reasonable and Prudent Measures

RPMs are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. The SCNF has the continuing duty to regulate the activities covered in this incidental take statement. If the SCNF fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these RPMs, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant RPMs will require further consultation.

NOAA Fisheries believes that the following RPMs are necessary and appropriate to minimize take of listed fish resulting from implementation of the action. These RPMs would also minimize adverse effects on designated critical habitat.

The SCNF shall:

1. Minimize the impact of incidental take by restricting dust abatement applications and monitoring water quality.

2. Minimize the impact of incidental take by preparing for contaminant spills.

3. Minimize the impact of incidental take by reducing potential impacts of the project from sediment.

4. Minimize the impact of incidental take by providing fish passage at all times.

5. Minimize the impact of incidental take by limiting the extent of vegetation clearing.

6. Monitor the effects of the proposed action to determine the actual project effects on listed fish (50 CFR 402.14 (I)(3)). Monitoring should detect adverse effects of the proposed action, assess the actual levels of incidental take in comparison with anticipated incidental take documented in the Opinion, and detect circumstances where the level of incidental take is exceeded.

2.6.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the RPMs described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement RPM 1 (dust abatement), above, the SCNF shall:

    a. Exclude the following sections of road from magnesium chloride dust abatement treatments due to the proximity of nearby water bodies: a marshy area along MP 5.6; 50 feet either side of the unnamed tributary crossing at MP 6.5; 50 feet either side of the Fir Creek crossing at MP 7.0; 50 feet either side of the Cold Creek crossing at MP 9.2; 50 feet either side of the unnamed Bear Valley Creek tributary crossing at MP 9.4; 50 feet either side of the Wyoming Creek crossing at MP 9.6; the paved Bear Valley Creek crossing from MP 10.0 to MP 10.4; and 50 feet either side of the Ayers Creek crossing at MP 12.5. This condition was agreed to verbally by the SCNF (Rose, pers. com. 2004).

b. Implement alternative safety measures where the road transitions between areas without magnesium chloride treatments. Measures such as placement of signs may be appropriate.

c. Reinitiate consultation if additional information on dust abatement becomes available that would change the analysis in this Opinion. This consultation covers dust abatement activities for five years from the date of signature.

2. To implement RPM 2 (contaminant spill preparation), above, the SCNF shall:

a. Require all construction and instream equipment to be clean prior to arrival at the construction site to prevent contamination of the stream by petroleum products. Prior to initial and subsequent move-ins, the contractor shall make equipment available for inspection at an agreed location so that untreated wash and rinse water will not be discharged into streams and rivers.

b. Place spill kits for hazardous chemicals on all equipment and project vehicles. Keep spill kits immediately available for all instream work sites.

c. Inspect daily all vehicles operating within an RHCA for fluid spills from machinery and vehicles. Contain and pick up spills immediately upon detection.

d. Store vehicles not in use in the vehicle staging areas outside of RHCAs.

e. In the case of a pollution event or release, including, but not limited to a fuel spill, notify NOAA Fisheries, USFWS, and the Idaho Department of Environmental Quality.

3. To implement RPM 3 (minimize sediment), above, the SCNF shall:

a. Divert stream flow around culvert replacement sites through a temporary culvert or a trench lined with plastic, rocks, or other material that prevents soil erosion.

b. Limit construction activities in the stream to the minimum area necessary to complete the project activities.

c. Place erosion controls to reduce sedimentation. A supply of erosion control materials (*e.g.*, silt fencing, straw bales) must be on hand to respond to anticipated and unanticipated sources of sediment delivery to

streams. All temporary erosion controls shall be in place and appropriately installed downslope of the project activities within the riparian area prior to and during all project activities. Effective erosion control measures shall be in place during the proposed activities, and will remain and be maintained until permanent erosion control measures are effective.

d. Develop a sediment basin and apply other BMPs outlined in the BA to prevent sediment from moving out of the borrow pit area into waterbodies or active springs.

e. Complete earthwork (including instream work) in the following manner:

(1) Channel material and topsoil that cannot be used for restoration efforts will be placed in an upland location where it is likely to enter streams or other waterbodies.

(2) All exposed or disturbed areas will be stabilized to prevent erosion, and replanted with native vegetation. Areas of bare soil within 150 feet of waterways, wetlands or other sensitive areas will be stabilized by native seeding, mulching, and placement of erosion control blankets and mats, if applicable, as quickly after exposure as possible. All other areas will be stabilized as quickly as feasible. Seeding will occur within the growing season.

(3) Sediment will be removed from sediment controls once it has reached approximately one-third of the exposed height of the control.

f. Conduct restoration and site cleanup, including protection of bare earth by seeding, planting, and mulching in the following manner:

(1) All areas disturbed by the construction activities will be restored to prework conditions.

(2) All exposed soil surfaces will be stabilized at finished grade with native herbaceous seeding, and native woody vegetation as soon as possible during the appropriate planting season.

(3) Disturbed areas will be planted with native vegetation specific to the project vicinity or the region where the project occurs.

4. To implement RPM 4 (fish passage), above, the SCNF shall:

   a. Provide fish passage around instream work areas at all times.

   b. If fish salvage is deemed necessary for juvenile anadromous fish, contact NOAA Fisheries (East Idaho Field Office, 208/756-6472) prior to any salvage operations.

5. To implement RPM 5 (vegetation clearing), above, the SCNF shall exclude the following sections of road from vegetation clearing due to the proximity to nearby water bodies: A straight stretch about 200 yards along MP 5.8 and beginning 50 feet before the Fir Creek crossing at MP 7.0 to MP 7.4.

6. To implement RPM 6 (monitoring), above, the SCNF shall:

   a. If a sick, injured, or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at (360) 418-4246. The finder must take care in handling sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

   b. Monitor construction activities to ensure proper implementation of the project to minimize take of steelhead and/or chinook salmon.

   c. Inspect all erosion control devices during construction to ensure that they are working adequately. If inspection shows that the erosion controls are ineffective, work crews will be mobilized immediately to make adjustments until they are functional. If sediment resulting from construction activities is not effectively controlled, work will cease until protective measures can be implemented.

   d. Conduct long-term water quality monitoring and reporting as described in the BA. This monitoring must also include the following measures:

      (1) Monitor magnesium chloride levels at a minimum of three streams at points downstream of magnesium chloride applications. Cape Horn Creek, Fir Creek, and Cold Creek would likely be most appropriate, but the specific selection shall be discussed with NOAA Fisheries prior to application.

(2) An initial selection of baseline samples on each stream will be collected prior to the commencement of any dust abatement activities. These samples must be collected at the time of year (*i.e.,* July) when magnesium chloride applications are most likely to occur in the future.

(3) Sample from each stream before and after each magnesium chloride application.

(4) As possible, sample from each stream after storms that could produce significant runoff.

e. Visually monitor the plume of sediment 100 yards downstream of those construction activities most likely to generate large sediment plumes. Sediment monitoring must occur when sediment enters the stream during placement or removal of cofferdams during for the culvert replacements, and during any road construction activities occurring immediately adjacent to live streams.

f. Provide an annual update on project progress and effectiveness at a scheduled Salmon-Challis Level 1 meeting after the conclusion of the work season and prior to the following season (*i.e.,* late fall or winter).

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Statutory Requirements

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan.

Pursuant to the MSA:

1. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

2. NOAA Fisheries must provide conservation recommendations for any Federal or state action that may adversely affect EFH (section 305(b)(4)(A)).

3. Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

The EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The EFH consultation with NOAA Fisheries is required for any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fishery Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in Sections 1.2 and 1.3 of this document. The action area includes habitats that are EFH for various life-history stages of chinook salmon.

3.4 Effects of Proposed Action on EFH

The effects on chinook salmon are the same as those for Snake River spring/summer chinook salmon and Snake River Basin steelhead and are described in detail in Section 2.2.1 of this document, the proposed action may result in short- and long-term adverse effects on a variety of habitat parameters. These adverse effects are:

1. Degradation of water quality from introduction of magnesium chloride into water bodies. This would likely cause short-term effects, but may also cause long-term effects.

2. Potential degradation of water quality from a contaminant spill. This would likely have a short-term adverse effect, but there is some possibility for a long-term effect.

3. Increases in turbidity and the recruitment of fine sediments. This is considered a short-term adverse effect, as the project will likely provide a long-term beneficial reduction in sediment.

4. A disruption to feeding habitat for fry and juvenile salmon associated with increases in turbidity impairing of feeding success due to visual impairment. Siltation may also decrease benthic invertebrate production. These are likely short-term effects.

5. A disruption to fish passage for juvenile fish due to the presence of increased levels of sediment. This is a short-term effect.

6. Disruption of riparian vegetation from magnesium chloride applications and vegetation clearing activities.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that may adversely affect EFH. NOAA Fisheries understands that the conservation measures described in the BA and contract documents will be implemented by the BPA, and believes that these measures are sufficient to help minimize the EFH effects. Although, these conservation measures are not sufficient to fully address the adverse effects to EFH, specific Terms and Conditions outlined in Section 2.7.3 are generally applicable to EFH for chinook salmon, and do address these adverse effects. Consequently, NOAA Fisheries recommends that the following terms and conditions be implemented as EFH conservation measures.

1. Term and Condition 1 will minimize EFH adverse effect 1.

2. Term and Condition 2 will minimize EFH adverse effect 2.

3. Term and Condition 3 will minimize EFH adverse effects 3, 4 and 5.

4. Term and Condition 5 will minimize EFH adverse effect 6.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The SCNF must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) ("Data Quality Act" [DQA]) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the document addresses these DQA components, documents compliance with the DQA, and certifies that this Opinion/EFH consultation has undergone pre-dissemination review.

4.1 Utility

The conclusion of this Opinion is the Boundry Creek Road Reconstruction Project is not likely to jeopardize the continued existence of Snake River spring/summer chinook salmon and Snake River Basin steelhead, and is not likely to destroy or adversely modify designated critical habitat for Snake River spring/summer chinook salmon. Therefore, the SCNF can proceed with contracting, funding, and implementation of the project.

The intended users of this ESA consultation document are the SCNF and contractors hired to complete project construction. Individual copies of the Opinion/EFH consultation are provided to the SCNF. The terms and conditions in the Opinion will be included in documents used by the contractors. The Opinion will be provided to all interested parties on the NOAA Fisheries website (*http://www.nwr.noaa.gov/1publcat/allbiops.htm*).

4.2 Integrity

This Opinion/EFH consultation was completed on a computer system managed by NOAA Fisheries in accordance with relevant information technology security policies and standards set out in Appendix III, "Security of Automated Information Resources," Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

The following categories of information describe the objectivity of the Opinion/EFH consultation:

1. *Information Product Category:* Natural Resource Plan.

2. *Standards:* This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific

research methods. They adhere to published standards including the NOAA Fisheries ESA Consultation Handbook, ESA Regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

3. *Best Available Information:* This consultation and supporting documents use the best available information, as referenced in the literature cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

4. *Referencing:* All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

5. *Review Process:* This consultation was drafted by NOAA Fisheries staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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